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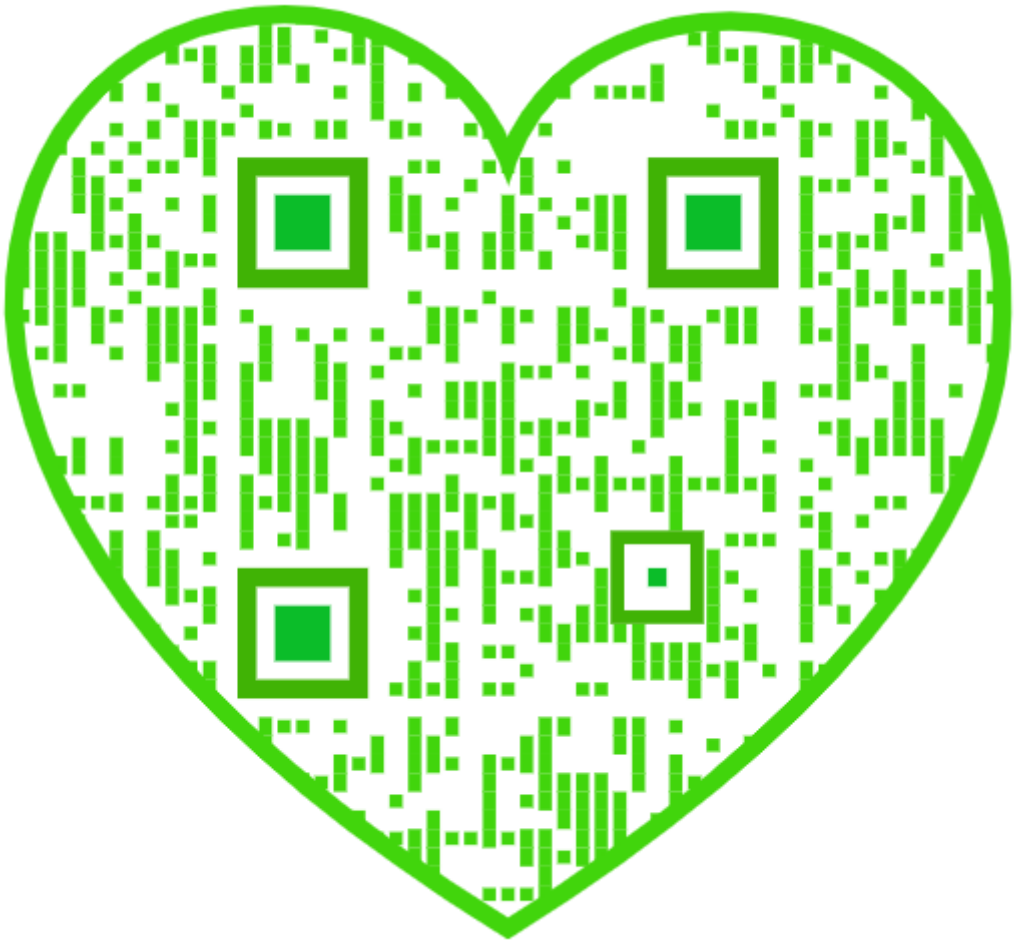

QUEEN-REARING

PRITCHARD

1916

Modern Queen-rearing

. by .

M. T. Pritchard

Queen-breeder for The A. I. Root Co.
Medina, Ohio

Published by
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Preface

This book was originally written by Mr. George W. Phillips, formerly head apiarist of The A. I. Root Co.; but Mr. Phillips left us to go to college; and since graduating from the college and seminary has entered the ministry.

Mr. Mel Pritchard, who has raised for us something like 20,000 queens, and who has worked for us for a number of years, has, since the Phillips edition was written, made a good many changes and improvements in methods. He has therefore revised and practically rewritten the book, bringing it clear up to date.

The methods here described are the same as Mr. Pritchard uses, and which long years of experience have demonstrated will yield not only quantity but quality. With the help of a single assistant, in about three months he raises from 3000 to 3500 queens. While a greater number might be produced, the quality would be impaired. When we say that the queens that Mr. Pritchard rears have demonstrated their ability to produce crops of honey, and to resist European foul brood, we have said all that needs to be said in regard to quality.

There are some fancy methods that will give a larger number of queens, and there are some tricks of the trade that Mr. Pritchard

might have given, but which, in the hands of the general public, would not work. He has been able to do anything that any queen-breeder has done or can do. But he has described only those methods which are reliable, and which any one who reads the directions carefully can carry out for himself, provided, of course, he has ordinary ability.

It is but fair to say that very few honey-producers will make good queen-breeders. It is much more of an art to produce good queens than to produce a crop of honey. Some may contradict this; but remember we say **good** queens. Any one can rear scrubs, but only a very few can raise queens of quality. The difference between a set of good queens in an apiary and poor ones is just the difference between a good crop and a medium or a poor one.

THE A. I. ROOT COMPANY.

March 22, 1916.

Modern Queen-rearing

When one makes a start in beekeeping he has to buy his queen bees. It is best that he continue to do so for some time after he has started in order to stock his yard thoroughly with a good strain of Italian bees, and counteract to some extent the influence of the black bees around his apiary. The honey-producer whose time is well occupied will usually find it more profitable to continue buying his queens than to raise them. But to those who are looking for healthful out-of-door employment, especially those unable to do heavy work, queen-rearing will be found very interesting and fairly remunerative.

Since this little work will find its way into the hands of some who know nothing of queen-rearing, we have endeavored to make it easy for them to understand some of the terms used by asking and answering a few elementary questions.

What is a queen-cell?

A large, peanut-shaped cell occupied by the queen before the time of hatching.

What is an embryo queen-cell?

One which has just started, the outlines of which have just commenced to appear.

What is a Doolittle cell-cup?

An artificial embryo queen-cell, invented by G. M. Doolittle.

What is a wood cell-cup?

A block of wood bored and coated with wax. The interior has the shape of the inside of an embryo cell.

What is royal jelly?

The highly concentrated predigested food fed to the queens in their larval state; in appearance white and not unlike flour paste.

What is a larva?

The bee-worm which hatches from the egg.

What is unsealed brood?

Larvæ in cells not yet capped over.

How many kinds of eggs does a queen lay?

Two—fertilized and unfertilized, or worker and drone.

Can a worker larva produce a queen?

Yes, but it should not be used if over thirty-six hours old.

What is grafting?

Applied to beekeeping it means the transferring of larvæ from worker to queen-cells.

What are "ripe" queen-cells?

Cells in which the larvæ have nearly reached hatching age; generally applied to those that are ten days old from the time of grafting, or fourteen from the time the egg was laid.

What are nursery cages?

Cages in which cells are placed in order to let the queen hatch in confinement.

The Natural Basis of Queen-rearing

There are three conditions or "impulses" under which bees will raise queens, viz., swarming, supersedure, and queenlessness. The modern queen-rearer creates one of these impulses and by making conditions favorable produces superior queens.

Swarming is the natural manner of increase. When a colony has built up to a strong, prosperous condition, a young queen is raised to remain with the young bees while the old queen leaves with the swarm. At about the time she hatches, the old bees and old queen swarm out and start the new establishment.

The first indication of the swarming impulse is the appearance of embryo queen-cells. After a few days an egg will be deposited in one or more of these cells and will hatch in three days. The tiny larva can then be seen floating on a bed of royal jelly. The cell and larva will increase in size rapidly, and the amount of royal jelly will increase in proportion. Five days after hatching, the larva will have reached its maximum size and will be sealed over to undergo the transformation from the larva form to the virgin queen. This requires from six to eight days, varying according to the temperature at which the cells are kept.

Supersedure is another natural impulse toward queen-rearing brought about by the failure of the old queen to keep up the normal strength of the colony. This may be caused by

old age, injury in the mails, or any other cause which prevents her from laying the usual amount of eggs. Bees know instinctively when their queen is nearing the end of her usefulness often before it is noticed by the beekeeper.

Queenlessness is an unnatural condition. For a colony to be suddenly deprived of a laying queen is abnormal and must result from an accident or from the deliberate action of the beekeeper. Should this occur at a time when there are no eggs or young larvæ in the hive, the colony becomes hopelessly queenless and will pass out of existence in a few weeks.

The process of queen-rearing may be separated into three divisions, grafting the cells, building and hatching them, and mating the queen.

Grafting the Queen-cell

In preparing a colony for grafting select one of medium strength, remove the queen, and, unless honey is coming in steadily from the fields, feed thin sugar syrup daily. The Boardman entrance feeder will be found best for this feeding.

At the end of three days the colony should have natural queen-cells well started. These are to be destroyed, making sure that not one is overlooked. One can usually get royal jelly from these to make his first graft. Remove one of the outside frames and move part of the other frames back, leaving a space in the center of the brood-nest into which hang a cell-frame.

These are frames so constructed as to contain three bars of cells. The bars are the size of a regular top-bar cut off at an angle, and should fit nicely when placed in position. (See Fig. 1.) They are made of pine or some soft wood, which makes it easy to pin on the cells. A good idea is to soak these bars in hot melted wax before using, as the resinous odor is thus removed, making it pleasant for the bees.

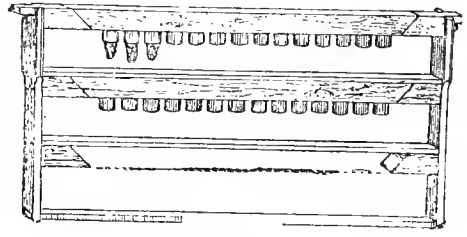


Fig. 1

A in Fig. 2 shows a section of a wooden cell-cup. This is made of a round wooden plug with a hole in one end to receive the wax-cell, and a nail-point on the other end for fastening it on to the cell-bar.

About fifteen cells should be placed on each cell-bar. The method of fastening the blocks in position is simple and effective. The projecting nail-point in the bottom of each makes it possible to pin them in as shown in the illustration. (See Fig. 2.) It is an easy

matter, and the pressure of the thumb is sufficient to get nail-points to penetrate the soft pine bar. The points can be inserted in the same holes again and again, as the blocks have no strain on them, and the bees glue them fast as soon as they are put into the hive.

B in Fig. 2 shows a wooden cup with the wax cell in position. The A. I. Root Company furnishes wax cells for this purpose at moderate cost to any one who needs them.

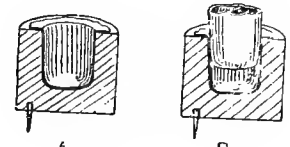


Fig. 2

After inserting a wax cell in each of the wooden cups a small amount of royal jelly is placed on the bottom of each one. This should be obtained from a queen-cell having a larva about three days old. It should be thoroughly stirred until it is of a smooth, cream-like consistency, and if too thick may be thinned with a drop or two of warm water. One well-fed queen-cell will contain enough jelly to prime forty cells.

The manner of priming the cells is shown in Fig. 3.

The object of modern queen-rearing is to improve the quality as well as to increase the quantity of the queens grown. In order to ac-

complish this the queen-breeder should have the best breeding queens obtainable. From one of these select a frame of brood having larvæ not over thirty-six hours old and proceed to transfer them to their new quarters.

Fig. 4 shows the manner in which the larva is removed from its cell. The point of the lifter should be a little further behind the larva than is illustrated—at just about the center of

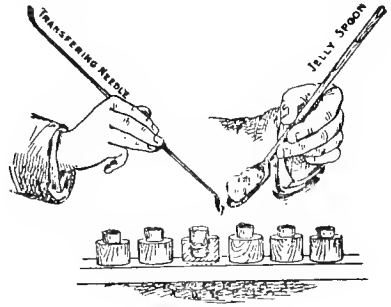


Fig. 3

the curve in its body. Some use a little jelly on the point of the lifter, and argue that, by using it, the larva adheres to the instrument more readily; but we prefer a clean, dry lifter. When the larva is removed from the comb it is placed upon the little nest of royal jelly prepared for it in the cell-cup.

Fig. 5 represents the beekeeper at work grafting queen-cells. The comb should be held at such an angle that the light will fall into the cells. There is no necessity for paring them

down; a little practice will soon enable one who has fair eyesight to lift out the larvæ from an ordinary comb with ease. At first the operation may prove difficult, but if one keeps right at it he will soon succeed.

Write the date of grafting on the cell-bars and give a bar to each of the prepared colonies. The empty frames will already have been in position to receive them. Little or no smoke should be used, but the cover gently removed and the bar slipped into position in the opening at the top of the cell-frame.

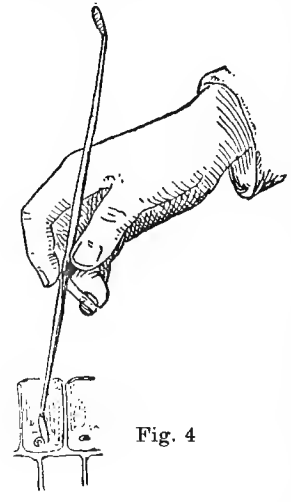


Fig. 4

If but a few queens are wanted, the cells may be left in the queenless colony until the tenth day from grafting, when they can be placed in nursery cages as described later. When one makes a business of queen-rearing, it will be found much better to remove them from the grafting colony twenty-four hours after grafting and to place them in colonies especially prepared for cell-building. Another bar of cells can now be grafted and given to the grafting colony, and this may be repeated daily for

fifteen days. It will be necessary to look through the colony carefully every other day for eight days to remove all natural queen-cells. After fifteen days a laying queen should be introduced, and the colony allowed to recuperate for thirty days.

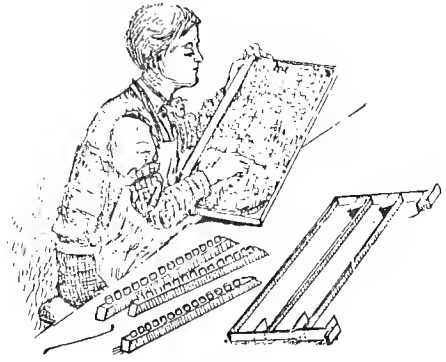


Fig. 5

Cell-building Colonies

Cell-building colonies should be strong two-story colonies having a prolific queen. The super should be full-depth with a queen-excluder between it and the lower story. Hang all the brood except one frame in the upper story; hang a cell-frame in the center and have the two frames next to it well filled with brood. The colony should be fed the same as the grafting colony. Once every ten days the frames in the upper story from which the brood has hatched should be exchanged for

frames of brood from the lower story. These colonies will do good work for an entire season providing a young laying queen is given them every forty days.

The young bees all hatching above while the queen is kept below brings about a condition similar to that of a failing queen—she is unable to follow up the hatching brood. An impulse toward supersedure is thus created and under it the cells are built. Twelve to fifteen of the newly accepted cells may be given these colonies at a time by fastening them to a bar placed in the top section of the cell-frame where they are left until the fifth day after grafting. Then move them down one section of the cell-frame and put in its place another bar of accepted cells.

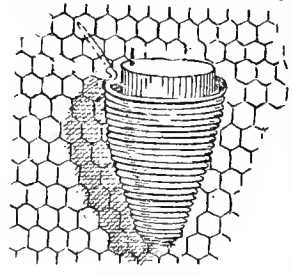


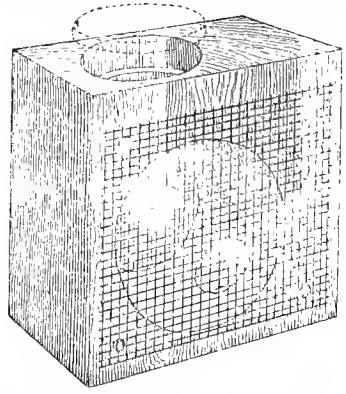
Fig. 6

Ten days from the time the cells are grafted the transformation from a larva to a virgin will be nearly completed, when the cells should be taken from the cell-building colonies and placed in cell-protectors to be given to queenless colonies or nuclei as shown in Fig. 6, or placed to hatch in nursery cages hung in strong colonies. When the weather is warm and the nuclei are strong, the former method will prove very satisfactory; otherwise the latter is to be preferred.

In introducing cells or virgin queens, always have them next to sealed brood. In removing the cells from cell-building colonies, great care should be taken in handling them. Do not shake the bees off but remove them with a brush, keeping the cells pointed downward at all times. The virgins are very delicate at this time and are easily crippled.

THE QUEEN NURSERY

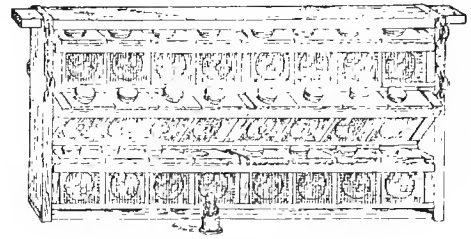
Of late years a number of improvements have been introduced in the construction of the nursery frame, especially valuable to the breeder who produces queens on a large scale.



Nursery Cage for Cells and Virgins

The nursery cage, here shown, has an opening at the top to receive the wooden cell cup, and the hole in the bottom is filled with queen-

cage candy to supply the young queen when she hatches. Twenty-four of these cages, supplied with cells, that are capped over, can be put in a nursery frame having holders which may be tilted on an angle so that any one cage can be easily removed from a holder without disturbing the rest. There are three of these holders in each frame, each of which is pivoted at each end as shown. When the nursery frame has been filled with cages, each containing a capped cell, it should be put down in the center of a strong colony.



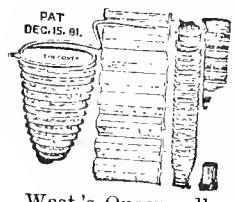
A Nursery Frame

While various artificial-heat incubators, using kerosene lamps have been devised, experience has shown for a majority of breeders that nothing is quite so good as a strong cluster of bees. What is still more, when the young virgins hatch, some of the bees will be inclined to feed them through the wire cloth, giving them a stimulus that they can not receive from the queen candy in the cage. After the virgins have hatched they should be transferred to

an introducing-cage, and introduced as soon after hatching as possible. The younger the virgin, the better success one will have in introducing. When she becomes four or five days old, even if she is accepted by the bees they are liable to mistreat her so that her usefulness thereafter will be greatly impaired. While it is possible to introduce these vrgins to full-sized colonies it is not practicable.

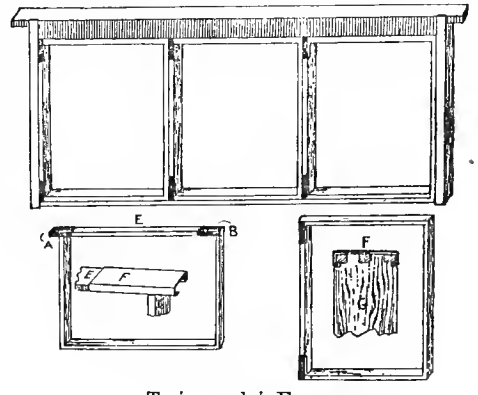
Mating Queens in Large Numbers

It sometimes happens that a breeder will have more virgins than he has queenless nuclei or colonies. In such cases we have found it practicable to introduce two queens at a time. First, a virgin, the younger the better, is introduced in an introducing-cage to a baby nucleus. In two or three days she should be released; in about four days more, or seven days after the time of caging, another virgin may be caged among the same bees, but the candy of the second cage by which the bees liberate the queen should be covered with a little strip of tin or the bees will liberate her prematurely. In two days more the first virgin will be mated, and in two or three days will be laying if the weather is favorable. After laying she is removed and sent out to fill an order; the



West's Queen-cell Protector

strip of tin covering the candy of the second cage is removed, when the bees will release virgin No. 2; and, having already acquired the colony odor, she will usually be accepted in less than a day's time. In about seven days from the time she was caged, a third queen, if there still is a surplus of virgins, is put into the nucleus while No. 2 is taking her mating-flight,



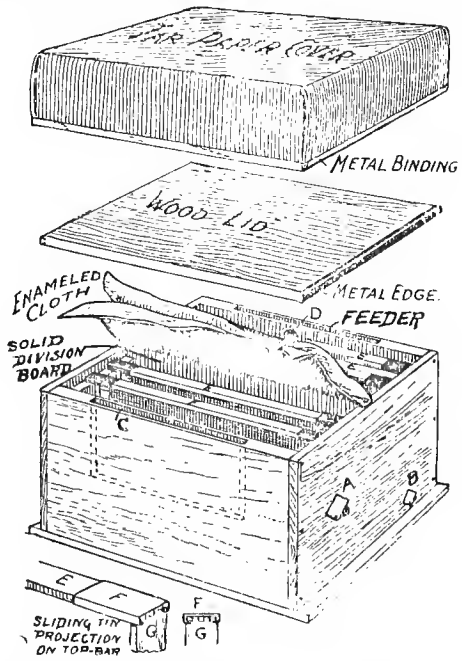
Twin-nuclei Frame

and so on the progress may be continued so long as there is a surplus of virgins.

This is really high-pressure queen-rearing, and it is to be practiced only when there is a surplus of virgins.

After securing a large lot of nice virgins in the cages already shown and described, it is next in order for us to consider the mating-box or hive. As already explained, one can use one

or two full-sized Langstroth frames and put them in a three-frame box or hive. When one desires to secure the largest number of queens possible from a given force of bees, a twin-



mating nucleus on a much smaller scale is to be preferred.

The illustration shows one the author is using. It is just large enough so that one of its

compartments on either side will take two frames of such size that three of them just fit the inside of a regular Langstroth frame. A division-board through the center lengthwise, ⅛ inch thick, divides the hive into two bee-tight compartments. The baby hive itself is on the same general principle as a full-sized hive, having rabbets on the end to support the frame projections. A square sheet of enameled cloth is laid over the top and tacked in the center so that either side may be uncovered without disturbing the other. A super cover is furnished to be placed over the enameled cloth and over this a telescope cover of heavy roofing paper.

In order that the little frames may hang in the rabbets and yet at the same time be fitted inside the full-sized Langstroth frame, the projections or supports are made of metal, and so constructed that they can be slid forward to form a projection, or slid back so as to be out of the way.

These little frames are filled with full sheets of foundation and inserted in a regular Langstroth frame when they may be hung in a strong colony to be drawn. Or better, if one has a lot of old defective combs he can cut out the good portions and fit them into these frames. They are now ready to hang into the nucleus-boxes. They should contain no brood and little if any feed.

When drawn these little frames may be taken out of the large frame, and the metal

projections can be shoved forward or outward, as shown at F and A, twin-nuclei frame shown on page 17. They are now ready to hang in the nucleus-box.

The mating-boxes are gotten ready for the bees by opening the ventilators, closing the entrances, filling feeders with thick sugar syrup, and hanging one frame in each compartment.

One should provide an empty hive-body having wire cloth nailed on the bottom, and a wire-cloth cover. Into this he can shake two or three frames of bees from one of these outyard colonies or as many bees as it can spare without detriment to the brood. The moment they are shaken in, the wire-cloth cover should be put on. Just before the next shake, the box of bees should be given a jounce, jarring all the bees to the bottom. More frames are shaken until the requisite number is secured. The wire-cloth cover should then be secured.

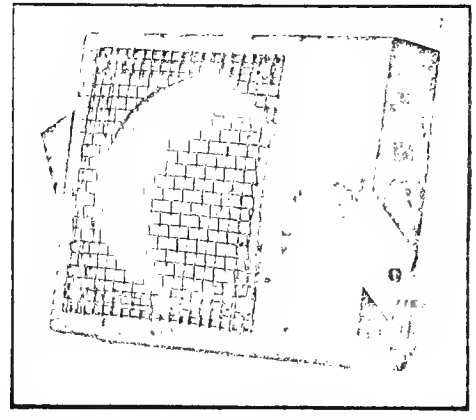
On arrival at the mating-yard the bees should be thoroughly wet so that they cannot fly. Drop a virgin queen in each compartment and with a small dipper pour in approximately one-fourth pound of bees, close up the boxes, and set them in a cool shady place, leaving them there until late in the afternoon of the following day when they should be placed in their permanent stands. They should not be released until early the next morning. Ripe queen-cells may be used in place of the virgins by pressing one carefully into the frame before the bees are poured in.

After the bees have quieted down from their first fly, open the boxes and the feeders will be found empty and the feed stores in the one frame. This should be shoved out next to the feeder, and an empty frame hung in beside the division-board to be filled with eggs when the young queen is ready to lay.

The whole yard should be placed some distance from the main yard where the strong colonies are. This is to avoid robbing.

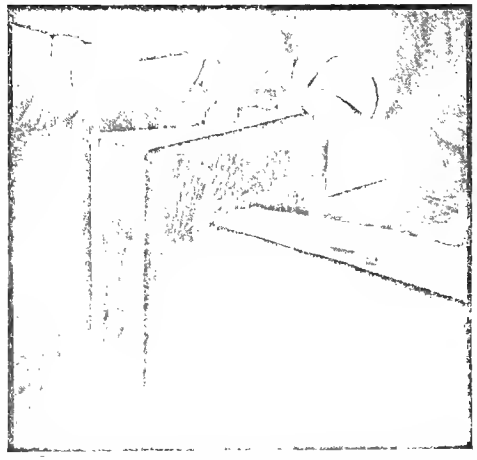
A telescope cover of roofing-paper neatly folded down over the whole hive shuts out the wind and weather.

The Pritchard Introducing-cage



Introducing-cage showing both slides open. No sharp edges of wire cloth.

This cage is designed for introducing virgin queens into twin mating-boxes. It consists of an oblong block with a large hole bored in the side in which the queen is confined. There is a long hole in one end to hold the cage candy and a shorter tube in the other end for



Thin stick pushed in between the edge of the wire cloth and the block, effectually closing the inner end of the candy-hole and permitting same to be crowded full of candy.

putting the queen in. The wire cloth is put on in such a manner as to leave a narrow opening over the inner end of the candy-hole.

To candy the cage (see illustration) fasten a thin piece of hard wood on the edge of the

workbench, allowing it to project one-half inch, and slide the cage on to it so as to close the hole. Then press the candy in as shown in the illustration, Close the tin slide over the candy to prevent the bees from releasing the virgin too soon.

Put the virgin queen into the cage and place the cage on top of the frames, the open side down right over the center of the cluster. Twenty-four hours is usually long enough before allowing the bees to get at the candy.

Clipping the Queen's Wings

If you desire to make sure of your new swarms, clip the queen's wings. An opportunity for doing this is offered when they are removed from the nuclei for introduction into strong colonies. Take the queen from the comb by her wings with the right hand; hold the first finger of the left hand in front of her, and let her catch on to it. As soon as she does so, bring your thumb upon her feet; let go your hold on her wings, and, as she raises them in an effort to fly, clip off the membraneous portion on each side symmetrically. Never hold the queen by one foot only, or she will swing round and round and attempt to wring it off.

In Fig. 15, 1 gives an idea of how the queen should be picked up; 2, however, is misleading. The queen is to be held in exactly the opposite position from that shown—her head turned toward the end of the first finger, her body resting flat upon it, and her wings extended. No.

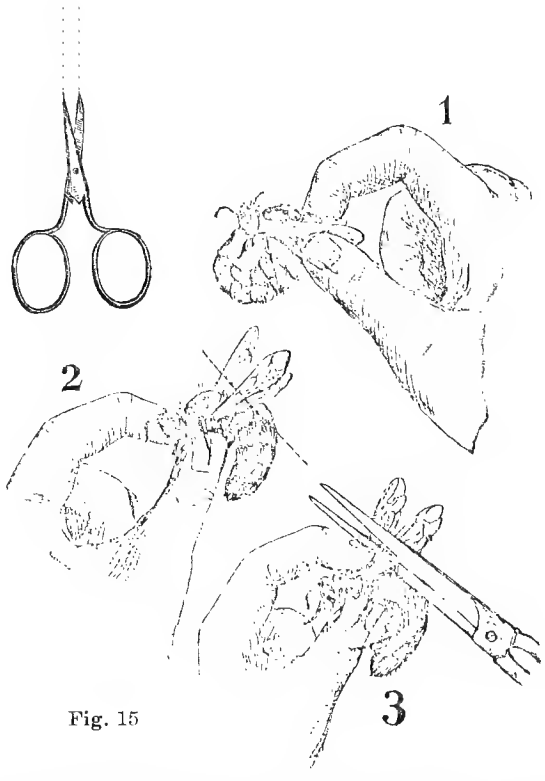


Fig. 15

3 shows another manner of holding her, and, for the beginner, perhaps a safer one. She is taken up by the wings, as shown in 1, and the fingers of the operator rest upon the thorax, which, being harder, is less liable to injury. Beginners had better clip the wings on one side only, as those on the other serve as a means of lifting her in the future.

THE ROOT QUEEN-REARING OUTFIT.

We furnish a complete set of tools and materials for the beekeeper who desires to rear his own queens at small expense, and at the same time allow his regular strong colonies to go on uninterrupted producing honey. The outfit consists of the following:

24	queen-nursery cages	$1.92
1	queen nursery frame	.20
100	wooden queen-cell cups	.50
200	artificial compressed cell cups	.50
3	cell-bars	.15
10	Miller introducing-cages	.80
1	jelly-spoon	.15
1	transferring-needle	.25
1	booklet, "Modern Queen-rearing"	.10

The Complete Outfit $4.50

The grafting-tools comprise first, a transferring-needle, for dropping a small quantity of royal jelly into each cup, and for transferring a small larva from a select breeding queen; and, second, a jelly-spoon for lifting out royal jelly from queen-cells.

CAGES FOR SHIPPING QUEENS.

We furnish various sizes and styles of cages for sending queens by mail. These are furnished in three ways, complete with candy, complete without candy, or the bare blocks bored at prices listed below.

Name and description of cages	Complete provisioned			Without candy	Block bare
	1	10	100	100	100
Small Benton	$0.06	$0.50	$4.20	$3.00	$1.80
Long-distance Benton	.09	.75	6.50	4.80	3.00
Export Benton	.12	1.00	8.50	5.40	3.60

Covers	10	100	500
Benton covers (small or long dist.) printed	.05	.25	1.00
Benton covers (wood) printed	.15	.90	3.00

Benton cage-covers are printed both sides. Name and address will be printed in place of ours for 50 cts. per 100, or $1 25 for 1000 extra.

Queen-register cards, 5 cts. for 10; 50 cts. per 100.